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LUMINARY Memo #219

To: Distribution
From: C. Schulenberg
Date: 26 May 1971
Subject: Descent Abort Procedures for Apollo 15

LUMINARY Memo #216 recommended a simple procedure that could be used for selection of P70 or P71 when the abort discretes are "backed-up", i.e., bit 1 of the padload CHANBKUP is set. The procedure required only that the abort or abort stage button be depressed and then followed as soon as possible by verb 37 selection of P70 or P71. Prior to the issuance of LUMINARY Memo #216 a substantial amount of digital and hybrid testing of this procedure had been performed and in all cases the guidance and control functions of the descent programs remained well-behaved even with long lapses of time between the depression of the abort or abort stage pushbuttons and the subsequent keying-in of V37E70E or V37E71E. A DPS abort, of course, caused no problems because a simple activation of the abort button produced no change in the state of the vehicle or the engine or the software. Subsequent to these tests it was learned that it is normal practice to set the manual throttle to maximum at the time of DPS abort initiation. A second oversight in the testing effort was in not trying the abort stage sequence in the final stages of P64. In the terminal portion of P64 the guidance equations will command significant attitude maneuvers in an attempt to cope with the increased thrust resulting from an abort stage or a maximum setting of the manual throttle. In the light of digital tests made of various types of aborts late in P64, it now appears that only four to six seconds are available for execution of the total procedure presented in LUMINARY Memo #216. Since it was felt that this is insufficient time to key in the requisite number of keystrokes, attention was turned to alternate procedures. The obvious requirement for a reliable procedure was that the guidance and control functions of the computer must be suspended within a few seconds after

depression of the abort or abort stage pushbuttons and then reactivated following entry into P70 or P71. At the present time the following six step procedure is being used in the Level VI testing effort at the Draper Laboratory:

1) Set manual throttle to maximum setting (optional).
2) Depress abort or abort stage pushbutton.
3) Place mode control switch in Attitude Hold position.
4) Key in V37E70E or V37E71E.
5) Key in Enter to flashing V50 N25 display (R1 = 203).
6) Place mode control switch in Auto.